

## PART 540 - FIELD SURVEYS

### 540.00 General.

Concise, accurate, and legible engineering notes are necessary to document planning, design, and construction. They support expenditure of Federal and other funds for conservation installations. Technical Release No. 62, Engineering Layout, Notes, Staking and Calculations and Engineering Field Handbook, Chapter 1, "Engineering Surveys" provide the recommended format for engineering notes and related staking.

### 540.01 Format.

Each state conservationist is to establish, within this framework, the format and minimum requirements for engineering notekeeping. Engineering records are to be uniform to simplify training and to improve clarity and overall efficiency. If local contracting organizations elect to use their own engineering staffs or if consulting engineers or other qualified persons do the engineering, notekeeping must be of comparable quality and similar content to the sample format in Technical Release No. 62. When using electronic data collection systems to record survey data, a method shall be developed to provide hardcopy documentation of the recorded data.

(a) For Class V - VIII jobs and other major projects in which work is usually performed by formal contract; or, if the notes may be needed as supporting data in potential legal actions:

(1) Bound field notebooks shall be used to record engineering surveys and notes when electronic data collection systems are not used.

(2) When electronic data collection systems are used to record the engineering surveys, an unaltered hardcopy of the survey data shall be downloaded from the data collector and permanently filed with the bound field notebook which contains other important project survey information for that project.

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(b) Loose-leaf notebooks, special forms, or hardcopies of downloaded electronic data may be used for recording engineering surveys, notes, and design data for on-farm conservation practices (Class I - V jobs) such as ponds, terraces, diversions, waterways, and animal waste management facilities. The documentation for the engineering surveys for conservation practices shall provide the minimum information as outlined in the sample notes in Technical Release No. 62 in a format similar to the sample.

### 540.02 Precision and accuracy.

The required precision and accuracy of each survey will vary with its purpose; therefore, each state conservationist shall establish the minimum requirements for precision and accuracy within the framework outlined in Engineering Field Handbook.

### §40.03 Staking.

(a) Basic stakes. Basic staking is defined as alignment and grade stakes for structures other than embankments and channels. For channels and embankments, basic staking includes alignment and grade stakes plus slope stakes at the normal interval for the work. Normal interval is 100-foot stations on tangents and may decrease to as little as 25 feet on sharp curves. When construction pay quantities are determined from basic staking, a fair and equitable description of the ground surface is needed for the calculation of performance quantities.

(b) Construction stakes. Additional stakes necessary for forming the structure, constructing the slopes of embankments above the slope stakes, or constructing the sides of channels below the slope stakes or between stations are "construction" stakes. They are the responsibility of the construction contractor.

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### 540.04 Contractor Surveys.

Contractor surveys are applicable to construction contracts and conservation operations that require the Contractor to provide basic staking; quantity surveys, measurements, and computations for progress payments; and when authorized, provide original and final surveys for final quantity determinations. The National Engineering Handbook, Section 20, shall be used to provide contract requirements for contractor surveys. Surveys completed under conservation operations shall follow the requirements of the Engineering Field Handbook, Chapter 1, "Engineering Surveys". Primary Controls, which include items such as baselines, control points, and bench marks, shall be sufficiently defined to allow the contractor to perform the required surveys.

### 540.05 Checking.

NRCS employees or individuals under contract with NRCS are to conduct quality assurance checking. Checking shall include the visual review of survey markings, notes, and random surveys to check for accuracy.

### 540.06 Responsibility.

The information from basic staking of embankments and channels normally becomes the basis for measurement of quantities of earthwork; therefore, it is to be done by NRCS, an A-E, the local contracting organization, the owner, or the contractor as prescribed within appropriate construction contracts, or the General Manual.